

What is claimed is:

1. A prediction mode determination method comprising:
 - (a) grouping a plurality of predetermined prediction modes into a predetermined number of groups;
 - (b) selecting one prediction mode for each of the groups, respectively, performing predictions for a predetermined block in the selected prediction modes, and calculating prediction errors in the selected prediction modes; and
 - (c) performing predictions for the predetermined block in other prediction modes belonging to a group including a prediction mode with a smallest prediction error among the calculated prediction errors, calculating prediction errors in the other prediction modes, and deciding a prediction mode according to the calculated prediction errors in the other prediction modes.
2. The method of claim 1, wherein in step (a), the plurality of prediction modes are partitioned into the predetermined number of groups according to different directions of predictions.
3. The method of claim 1, wherein in step (a), according to different directions of predictions, a prediction mode corresponding to a vertical direction and adjacent prediction modes corresponding to directions adjacent to the vertical direction are grouped into a first group, a prediction mode corresponding to a horizontal direction and adjacent prediction modes

corresponding to directions adjacent to the horizontal direction are grouped into a second group, and remaining prediction modes corresponding to remaining directions are grouped into a third group.

4. The method of claim 1, wherein in step (b), the selected prediction modes are a prediction mode corresponding to a vertical direction, a prediction mode corresponding to a horizontal direction, and a prediction mode (DC prediction mode) corresponding to a current location.

5. The method of claim 1, wherein step (c) comprises:

(c1) performing predictions for the predetermined block in the other prediction modes belonging to the group including the prediction mode with the smallest prediction error and calculating prediction errors in the other prediction modes; and

(c2) comparing the calculated prediction errors in the other prediction modes to each other and outputting a prediction mode with a smallest prediction error according to a result of comparing the calculated prediction errors in the other prediction modes to each other.

6. The method of claim 5, after step (c2), further comprising:

(c3) performing prediction for the predetermined block in a prediction mode corresponding to a prediction direction adjacent to a prediction direction of the prediction mode output in step (c2), and calculating prediction errors in

the prediction mode corresponding to a prediction direction adjacent to a prediction direction of the prediction mode output in step (c2); and

(c4) comparing the calculated prediction errors in the prediction mode corresponding to a prediction direction adjacent to a prediction direction of the prediction mode output in step (c2) to each other and outputting a prediction mode with a smallest prediction error according to a result of comparing the calculated prediction errors in the prediction mode corresponding to a prediction direction adjacent to a prediction direction of the prediction mode output in step (c2) to each other.

7. The method of claim 1, wherein the predetermined block is a luminance block.

8. The method of claim 1, wherein the prediction error is a residue value obtained by subtracting an original pixel value of the predetermined block from a predicted pixel value of the predetermined block, and is calculated using a predetermined cost function.

9. A prediction mode determination method comprising:

(a) performing predictions for a predetermined block in a vertical prediction mode corresponding to a vertical direction, a horizontal prediction mode corresponding to a horizontal direction, and a DC prediction mode corresponding to a current location, and calculating prediction errors in the respective modes; and

(b) performing predictions for the predetermined block in prediction modes corresponding to prediction directions adjacent to a prediction direction of a prediction mode with a smallest prediction error among the calculated prediction errors in the respective modes, calculating prediction errors in the prediction modes corresponding to prediction directions adjacent to a prediction direction of a prediction mode with the smallest prediction error among the calculated prediction errors in the respective modes, and selecting a prediction mode with the smallest prediction error among the calculated prediction errors in the prediction modes corresponding to prediction directions adjacent to a prediction direction of a prediction mode with the smallest prediction error among the calculated prediction errors in the respective modes.

10. The method of claim 9, after step (b), further comprising:

(c) performing predictions for the predetermined block in prediction modes corresponding to prediction directions adjacent to a prediction direction of the selected prediction mode, calculating prediction errors in the prediction modes corresponding to prediction directions adjacent to the prediction direction of the selected prediction mode, and selecting a prediction mode with a smallest prediction error among the calculated prediction errors in the prediction modes corresponding to prediction directions adjacent to the prediction direction of the selected prediction mode.

11. The method of claim 9, wherein the prediction mode is a 4x4 intra luminance prediction mode.

12. A prediction mode determination apparatus comprising:
a prediction unit, which performs prediction for a predetermined block in a predetermined prediction mode, and outputs a prediction sample;
a prediction error calculator which calculates a prediction error for the prediction sample; and
a prediction error comparator, which compares prediction errors received from the prediction error calculator to each other, selects a prediction mode with a smallest prediction error according to a result of the compared prediction errors, and outputs the selected prediction mode.

13. The apparatus of claim 12, wherein the prediction unit selects one prediction mode for each of a plurality of groups partitioned according to different directions of predictions.

14. The apparatus of claim 12, wherein the prediction unit priority-performs predictions for the predetermined block in a vertical prediction mode corresponding to a vertical direction, a horizontal prediction mode corresponding to a horizontal direction, and a DC prediction mode corresponding to a current location.

15. The apparatus of claim 12, wherein the prediction error calculator calculates the prediction error (residue value) by subtracting an

original pixel value of the predetermined block from a pixel value of the prediction sample, using a predetermined cost function.

16. The apparatus of claim 12, wherein the prediction unit receives prediction mode information with a smallest prediction error from the prediction error comparator, and performs secondary prediction for the predetermined block in prediction modes corresponding to prediction directions adjacent to a prediction direction according to the received prediction mode information.

17. The apparatus of claim 12, wherein the block is a luminance block.

18. A computer readable medium having embodied thereon a computer program for a prediction mode determination method comprising:

(a) partitioning a plurality of predetermined prediction modes into a predetermined number of groups;

(b) selecting one prediction mode for each of the groups, respectively, performing predictions for a predetermined block in the selected prediction modes, and calculating prediction errors in the selected prediction modes; and

(c) performing predictions for the predetermined block in other prediction modes belonging to a group including a prediction mode with a smallest prediction error among the calculated prediction errors, calculating prediction errors in the other prediction modes, and deciding a prediction

mode according to the calculated prediction errors in the other prediction modes.